U.S. Fish & Wildlife Service

Refuge Report 2017.5

The Social Science Component to Comprehensive Kodiak Bear Viewing Management: Public Use Survey Summary

2016 Public Use Survey Report

Jacqueline M. Keating

Jacqueline Keating/USFWS

Kodiak National Wildlife Refuge
Kodiak, Alaska;
August 2017

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Suggested Citation:

Keating, JM. 2017. The social science component of Kodiak bear viewing management: Public use survey summary. 2016 season report. Refuge report 2017.5., U.S. Fish and Wildlife Service, Kodiak National Wildlife Refuge, Kodiak, Alaska.

Keywords:

Brown bear, *Ursus arctos middendorffi*, bear viewing, wildlife viewing, Kodiak Island, human dimensions, social science, public use surveys, visitor use management

TABLE OF CONTENTS Page

The Social Science Component of Comprehensive Kodiak Bear Viewing Management: Public Use Survey Summary

2016 Season Report

Jacqueline Keating

Abstract

In order to make scientifically informed decisions on visitor use management, the Kodiak Refuge conducted social science research to objectively assess the current nature of bear viewing opportunities, significant factors that influence the quality of those opportunities, and public acceptability of potential changes to bear viewing. A season of qualitative research in the form of stakeholder interviews (Keating, 2016) informed the creation of a survey measurement tool that was given to bear viewers in the summer of 2016. The two-phase survey was administered on Kodiak Island to approximately 60% of total bear viewers for the season, achieving a 43% response rate (260 complete online responses) for the primary online portion. Results demonstrate that the number of bears seen, composition of bears, and previous bear viewing experiences at specific locations outside of Kodiak have positive relationships with overall trip satisfaction, while closer proximity to bears was associated with specific learning outcomes. Additionally, visitors reported overall positive changes in attitudes towards bears, intentions to perform behavior that will benefit bears, and knowledge about bears and related subjects. While results contribute to baseline standards for high quality bear viewing on the refuge, maintaining bear viewing with conservation benefits will require ongoing monitoring of both social and physical components, which are constantly changing and interacting in new ways.

Introduction

The 1.9 million acre Kodiak National Wildlife Refuge on Kodiak Island, Alaska, was established in 1941 for the purpose of protecting "the natural feeding and breeding range of brown bears and other wildlife on Uganik and Kodiak Islands" (Comprehensive Conservation Plan, 2007). The motivation for its establishment stemmed from concerned hunters who witnessed a depleted population of brown bears due to unregulated hunting. While hunting has been a prevalent form of wildlife-dependent recreation throughout the history of the refuge, other activities like wildlife viewing are only recently becoming significant drivers of public use. As the demand for wildlife viewing continues to increase drastically across the state of Alaska (Brown Bear Management Strategy, 2000; Shanks & Rasmussen 2010; Troyer, 2005), the Kodiak Refuge faces the challenge of balancing diverse public demands for recreation with carrying out its founding mission of protecting the unique wildlife and habitat of the Kodiak Archipelago. This research adds a sociological component to existing scientific research on the Kodiak Refuge in order to contribute to a comprehensive public use management plan.

Framework of Problem

As part of the National Wildlife Refuge System, the Kodiak Refuge facilitates hunting and wildlife viewing as part of six "appropriate and compatible" wildlife-dependent recreation uses, along with photography, fishing, environmental education, and interpretation (National Wildlife Refuge Improvement Act, 1997). Commercial guides for hunting, wildlife viewing, fishing, and air taxi operations apply for permits that allow them to facilitate these activities. Over the last 15 years, the number of clients for permitted wildlife viewing has generally increased, hitting just over 1,000 visitors for the 2016 season. In contrast, the number of clients for guided big game hunting has remained relatively consistent ranging between 80 and160 individuals since 2001 (Figure 1).

It is important to note that this stark difference between viewing and hunting is not an accurate representation of the financial impacts of these activities, as short-term bear viewers pay approximately $600 for a bear viewing trip while bear hunters could spend upwards of $20,000. However, the drastic difference in density of visitor use makes wildlife viewing an activity that needs to be proactively managed. Several areas on the refuge are closed to commercial bear viewing due to being critical feeding areas for bears, but many commercial operators feel that the current opportunities for operation are insufficient. Additionally, few mechanisms exist for management to monitor the impacts and quality of existing bear viewing operations. Finally, the increased volume of visitation within refuge boundaries warrants an understanding of visitor characteristics and expectations. Decades of biological data address the impacts of human activity on bear health and habitat (Deacy & Leacock, 2015; Smith, Herrero, & DeBruyn, 2005; Troyer, 2005; Whittaker, 1997; Wilker & Barnes, 1998), but research that measures the social aspects of wildlife management has been lacking (Allen & Collins, 2002).

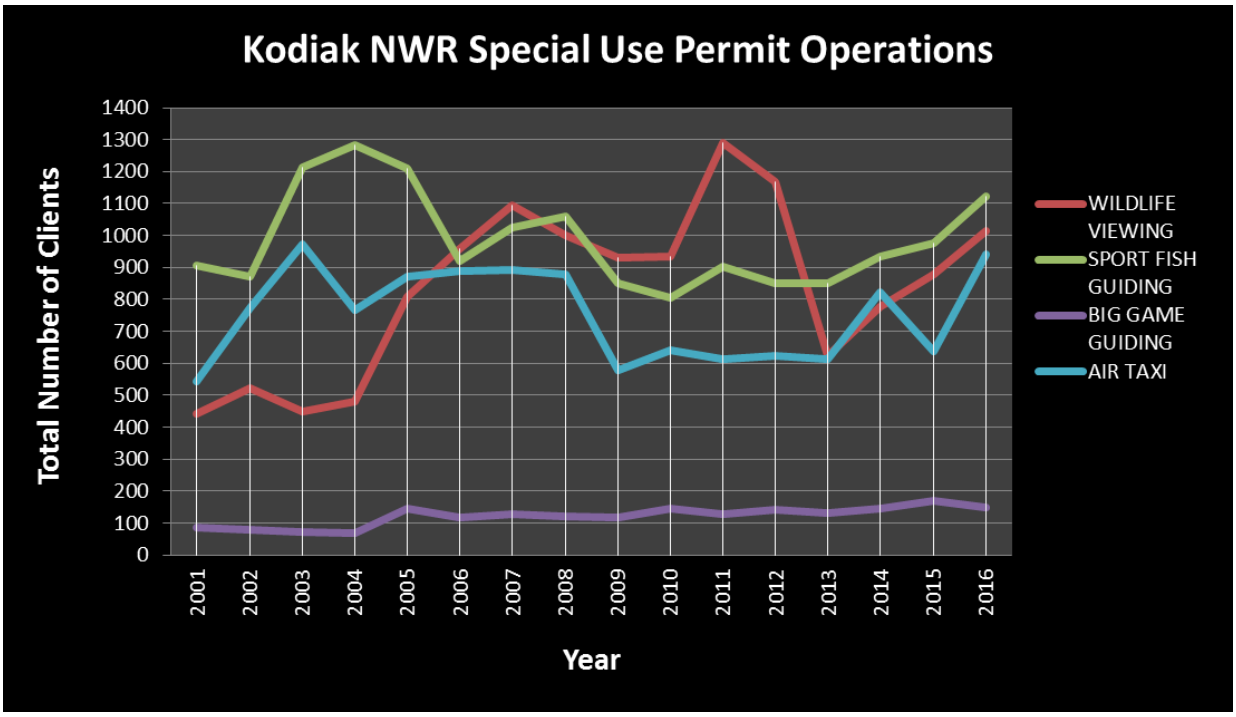


Figure 1 *Hansel Klausner/USFWS*

Relevance to Management

The Kodiak National Wildlife Refuge's current Comprehensive Conservation Plan specifically outlines the goal of providing "opportunities for quality public use and enjoyment of refuge resources through compatible fish and wildlife-dependent recreation." To address the increased demand for bear viewing opportunities, a specific objective of this goal is to:

> "Utilize rigorous social science to assess the nature of available visitor experiences, significant influences on those experiences, and public acceptability of potential changes to those experiences prior to developing the viewing program at O'Malley River (or any other new sites) or modifying the program at the Frazer fish pass site" (Comprehensive Conservation Plan, 2007).

This created the opportunity for a partnership with Utah State University to conduct two seasons of social science research. Because communication between management and stakeholders is vital to understanding the reasons for differences in acceptability of management policy among stakeholder groups (Bath, 1998; Zinn, Manfredo, & Vaske, 2000), a season of stakeholder interviews preceded survey administration. While a summary of this research is available in a separate U.S. Fish and Wildlife Service report (Keating, 2016), there are some key outcomes with direct project implications that should be highlighted. Stakeholders expressed a wide range of opinions on what the future of bear viewing on the Kodiak Refuge should look like. Many commercial operators feel that the Frazer viewing site alone is insufficient for meeting the public demand for bear viewing. Others are opposed to any new bear viewing locations, especially because the influx of bear viewing as a recreational activity can cause conflict with traditional hunting uses. However, most stakeholders agreed that Kodiak is a rugged location that is often difficult to access and therefore self-limiting for the volume of visitor use. Therefore, management of bear viewing becomes more of a quality rather than a quantity issue.

Social science enables managers to establish sociological carrying capacities with empirically-based standards of quality that can and should be adjusted over time (Laven & Krymkowski, 2005; Nielsen, Shelby, & Haas, 1977). This project also allowed for the examination of positive outcomes associated with bear viewing. Several stakeholders suggested that bear viewing has the potential to foster desired attitudes, behaviors, and knowledge changes among visitors that could ultimately have positive implications for bears. The public use survey incorporated questions to examine how bear viewing may be related to changes in attitudes toward bears and conservation, intentions to perform the correct behaviors that keep both people and bears safe in bear habitat, and knowledge about bears and related components.

Study Area

The Kodiak Refuge occupies two-thirds of Kodiak Island and is only accessible by boat or floatplane (Figure 1). In the state of Alaska, bear viewing has come to play a significant role in the economic activity generated from tourism (Brown Bear Management Strategy, 2000; Dodge, 2004; Drygas & Hladick, 2015; Fortin et al., 2016; Shanks & Rasmussen, 2010). As home to some of the largest brown bears in the world, Kodiak has become a top destination for many bear viewers. The U.S. Fish and Wildlife Service currently staffs one structured bear viewing location at the Frazer Fish Pass, which primarily attracts visitors for half-day viewing experiences. At this site, a naturally elevated viewing pad concentrates visitors in one area overlooking Frazer Falls and the bears that fish there. The Alaska Department of Fish and Game manages a weir and fish ladder that has enabled an introduced population of sockeye salmon to travel over the falls since 1961. The consistent presence of employees at this site contributed to a local bear population that exhibits a tolerance of human presence and carefully managed outdoor recreation activities.

A second formal bear viewing site has been operated on the O'Malley River off the south end of Karluk Lake, where studies conducted by the Refuge determined that bears could tolerate viewing programs along the local fishing streams if human activities were predictable and restricted to defined areas (Wilker & Barnes, 1998). Historically this location has been home to one of the densest brown bear habitats on the Refuge (Troyer 2005), although the average number of bears feeding on this and adjacent streams has decreased in recent years (Deacy & Leacock, 2015). The O'Malley bear viewing site was most recently permitted as an exclusive use area to a single outfitter who proposed to use the area during multi-day trips.

In addition to these two sites, permitted guides run viewing trips of varying lengths in approved, unstructured areas throughout the Kodiak Refuge. These trips typically require a larger time and financial commitment from participants, and remote trekking conditions for some trips demand higher levels of physical ability. Several areas throughout the Refuge have been closed to commercial operation for over two decades after being deemed "critical feeding habitat" for bears, including Connecticut Creek, Red Lake, and Lower Frazer Falls. Many commercial operators would like to see some or all of these areas reopened in order to provide more half-day bear viewing opportunities on the island rather than relying on the short window of bear activity at the Frazer Fish Pass. Finally, members of the public are welcome to view bears independently via public use cabins, camping, or unguided day trips to the Refuge.

The town of Kodiak is about 45 minutes from the Katmai Coast on mainland Alaska (the same amount of time it takes to fly to the Frazer viewing site). Therefore, commercial operators located in Kodiak often fly clients to Katmai, which is managed by the National Park Service. When bears become scarce at the Frazer viewing area, it is not uncommon for operators to rely on bear viewing opportunities off the island. Some operators report that clients are upset when they come to Kodiak and do not get to see a Kodiak bear due to lack of access to the high-density bear areas on the Refuge. A map of the key viewing locations utilized by Kodiak operators is displayed in Figure 2.

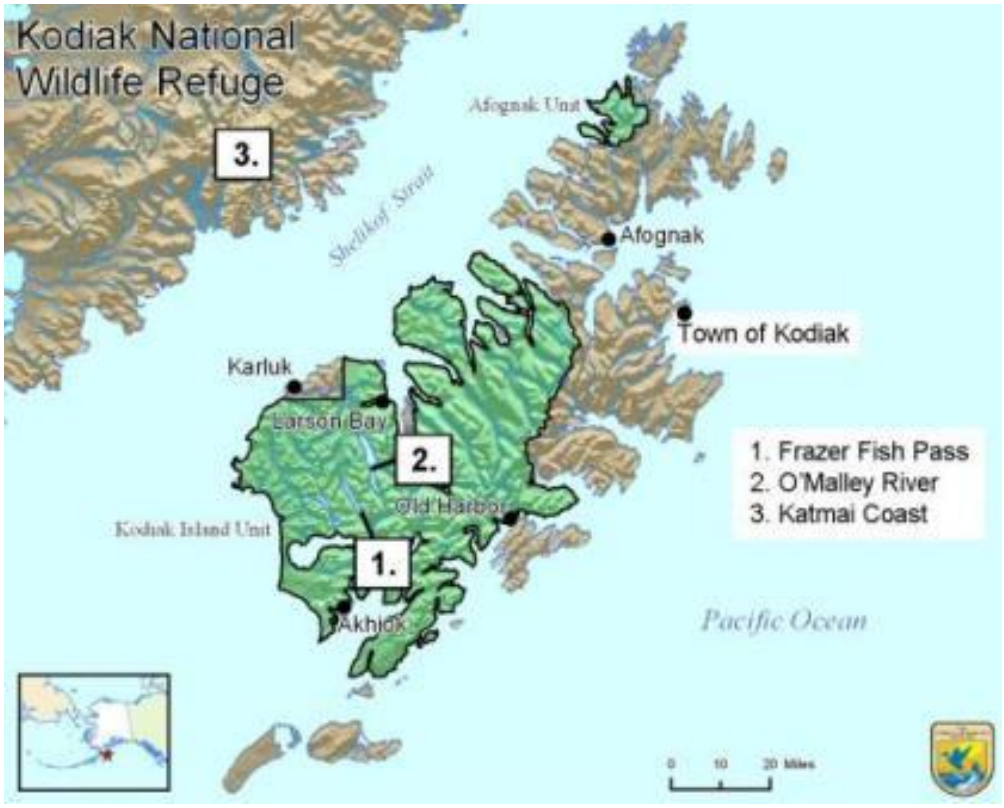


Figure 2

Minimizing human impacts on bears and habitat is a critical component of compatible bear viewing on the Kodiak Refuge. Habituation, or the process of waning responses to a repeated stimulus, can lead to bears ignoring the presence of humans in situations where people display consistent and non-threatening behavior (Smith et al., 2005; Whittaker, 1997). While this bodes well for close-range bear viewing at salmon feeding areas, there is a concern that habituation can have negative impacts for wild bear populations by removing a natural fear of humans (Allen & Collins, 2002; Troyer, 2005). Additionally, animals that do not become comfortable with human presence may avoid the perceived risk of humans by relocating from prime feeding areas to sub-optimal ones, which can pose a challenge for consuming sufficient amounts of food (Gill, Sutherland, & Watkinson, 1996). Bears can also make temporal adjustments by feeding early and late in the day to avoid human presence (Fortin et al., 2016). For bears that cope in this manner, multi-day viewing is a more stressful activity because human presence is constant throughout the day rather than occurring only during short periods that can be avoided (Rode, Farley, Fortin, & Robbins, 2007). However, since air traffic increases substantially when half-day trips increase, more research is needed on the impacts of airplane traffic on bear stress and feeding patterns (Wilker & Barnes, 1998).

Study Framework

Just as biologists are concerned with ongoing inventory and monitoring of biological resources, social science research identifies, documents, and analyzes changes in attitudes, beliefs, and knowledge in human resources (Bath, 1998). Therefore, user satisfaction models for outdoor recreation and wildlife viewing should include a wide range of variables associated with satisfaction and other trip outcomes (Duffus & Dearden, 1990; Johansson et al., 2012; Nielsen et al., 1977; Whitaker, 1997). A multivariate framework inspired by a model developed by Powell et al. (2009) was the best fit for key factors influencing the outcomes of Kodiak bear viewing (Figure 3). The study's framework incorporates visitor's demographic characteristics, physical trip characteristics, motivations, and trip outcomes including satisfaction, attitudinal changes, intent to perform positive behaviors, and knowledge gains. Each variable in the framework was included due to significance in the literature or stakeholder interviews, and is accounted for in the online survey.

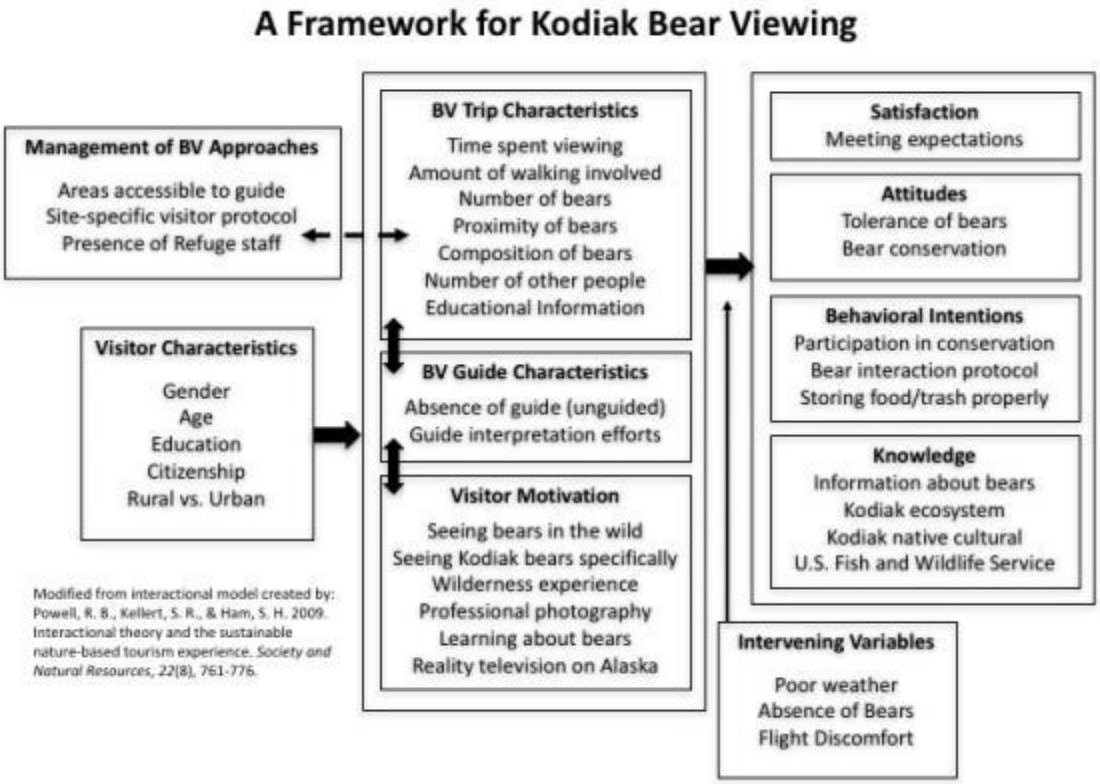


Figure 3

Research Questions

The quantitative phase of this study was guided by three overarching research questions. This first two came directly from the Refuge's Comprehensive Conservation Plan, and the third arose from the qualitative phase of research:

Q1: What is the nature of current bear viewing experiences on the Kodiak refuge?
Q2: What are the significant influences on visitors' bear viewing experiences?
Q3: Do current bear viewing experiences have broader conservation benefits for bears by fostering desired changes in visitors' attitudes, behavioral intentions, and knowledge about bears and related issues?

Methods

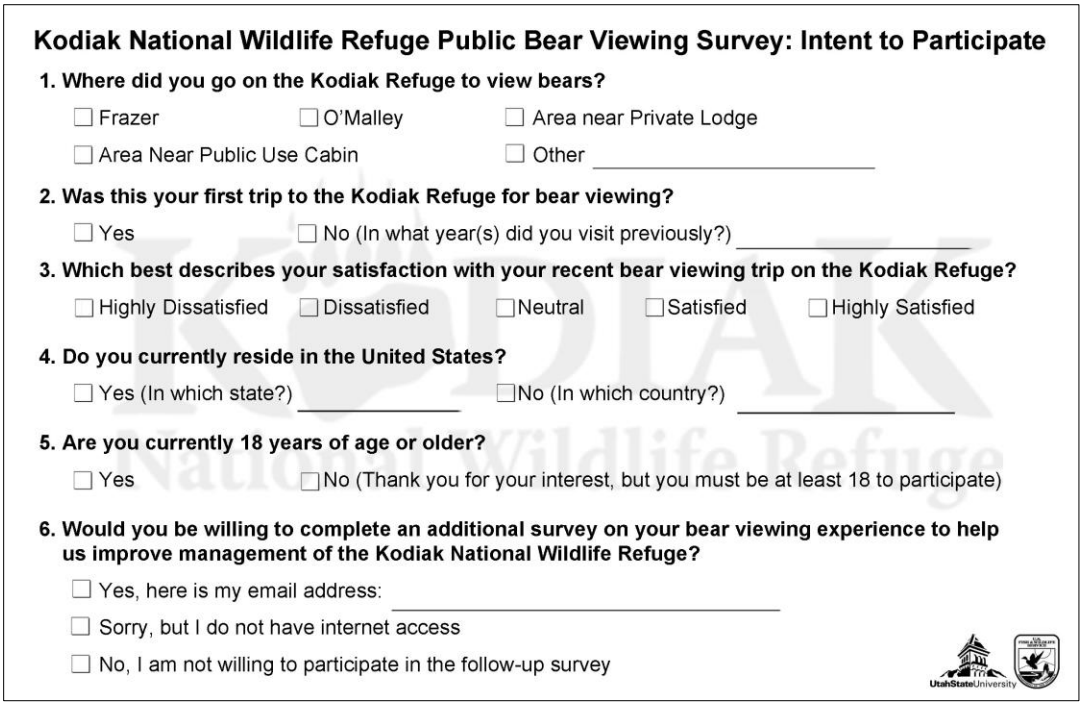
Mixed-Mode Survey Research

Mixed-mode survey research methods addressed the logistical challenges of surveying on a remote wildlife refuge by sequentially combining intercept postcard surveys and a more detailed online survey (see Figure 4 for survey card). Both phases of the survey were reviewed and approved by the Office of Management and Budget (OMB Control Number 1018-0166). To reach a sufficient number of respondents for reliable statistical analysis, total population sampling was employed when contacting bear viewers across the Kodiak Refuge. Air taxi operators were a key point of contact for initiating the postcard phase of the survey, since the vast majority of bear viewers need to hire air taxis to travel onto the refuge. To mitigate coverage error, survey cards were also given to guides and lodges that host bear viewers on the refuge. The Discover Kodiak and Kodiak Refuge Visitor Centers in town also had cards available for viewers who did not receive a card on their trip. Finally, the U.S. Fish and Wildlife Service park rangers who staffed the Frazer viewing area supplied cards to viewers on site so that air taxi operators were not held solely responsible for card distribution. Signs promoting the survey were posted at visitor centers, float plane offices, and public facilities at the Frazer site so that many visitors were aware of the survey prior to receiving a card.

Survey cards were collected from the operators approximately every two weeks to distribute email invitations for the larger online survey using Qualtrics survey software. Operators were asked to fill in a log for each day indicating the number of cards that were filled out versus how many bear viewers they flew back into town. A log was also kept at the Frazer site to track visitation and survey distribution. Data from cards were manually entered into a Microsoft Excel spreadsheet on a rolling basis. The second and primary phase of the survey provided participants with a unique online link to the Qualtrics website and online survey. Online invitations were sent to all individuals above the age of 18 who provided an email address. Those who had not completed the survey received a reminder email one and two weeks after the original email was sent.

Analysis

Once the online survey was closed, Qualtrics data was downloaded and transferred to SPSS for analysis. In addition to descriptive statistics, tests for statistical significance provided further information on the relationships among key variables that shape the bear viewing experience. Crosstabulations and chi-squared statistics summarized how close observed frequencies were to expected frequencies. Pearson's phi coefficient creates a standardized measure of association for a 2x2 table, and when the dimensions of a crosstabulation are larger than 2x2, Cramer's V is the measure that assesses the strength of association between variables (George & Mallery, 2003). For continuous dependent variables being compared to categorical independent variables, independent samples t-tests and analysis of variance tests examined possible differences in means among groups. In the social sciences, it is generally accepted that a *p* value less than .05 (indicating less than a 1 in 20 probability that an outcome occurred by chance) is statistically significant, with lower *p* values increasing confidence that research findings are valid (George & Mallery, 2003).



Kodiak National Wildlife Refuge Public Bear Viewing Survey: Intent to Participate

1. Where did you go on the Kodiak Refuge to view bears?

☐ Frazer ☐ O'Malley ☐ Area near Private Lodge
☐ Area Near Public Use Cabin ☐ Other _____

2. Was this your first trip to the Kodiak Refuge for bear viewing?

☐ Yes ☐ No (In what year(s) did you visit previously?) _____

3. Which best describes your satisfaction with your recent bear viewing trip on the Kodiak Refuge?

☐ Highly Dissatisfied ☐ Dissatisfied ☐ Neutral ☐ Satisfied ☐ Highly Satisfied

4. Do you currently reside in the United States?

☐ Yes (In which state?) _____ ☐ No (In which country?) _____

5. Are you currently 18 years of age or older?

☐ Yes ☐ No (Thank you for your interest, but you must be at least 18 to participate)

6. Would you be willing to complete an additional survey on your bear viewing experience to help us improve management of the Kodiak National Wildlife Refuge?

☐ Yes, here is my email address: _____
☐ Sorry, but I do not have internet access
☐ No, I am not willing to participate in the follow-up survey

Figure 4

Results and Discussion

Response Rates

A total of 665 documented contacts took place in the survey phase of this project, representing 64% of the total bear viewers reported by permitted operators for the 2016 season. The response rate for survey cards was extremely high (91% of documented visitors who were invited to fill out a card actually completed one), resulting in 608 valid and complete survey cards. The gap in the number of people contacted about the project and the total number of bear viewers reported for the season is attributed to simply missing some of the bear viewing groups, and having to close the survey period a few weeks before some operators' fall viewing trips took place. Of those who filled out a card, 81% (492 individuals) indicated that they would be willing to participate in the online survey, and a total of 260 of those individuals actually completed the online survey. This translates to a 43% response rate to the online survey for the population of visitors who filled out a survey card.

Because important differences exist in viewing experiences for those at the Frazer site and other locations, Figure 4 displays the percentage of responses for different survey phases for the two groups of respondents.Visitors to the Frazer site comprised 72% of reported viewers for the season, and with 219 responses, online survey participation represents 29% of total Frazer viewers. Contrastingly, the 41 online responses for other sites represent 14% of total viewers to other sites. Although response rates for those that completed the online survey based on those that filled out a card were similar for both group of viewers, survey cards were received from 68% of total Frazer viewers compared to only 35% of viewers from other locations (Figure 5).

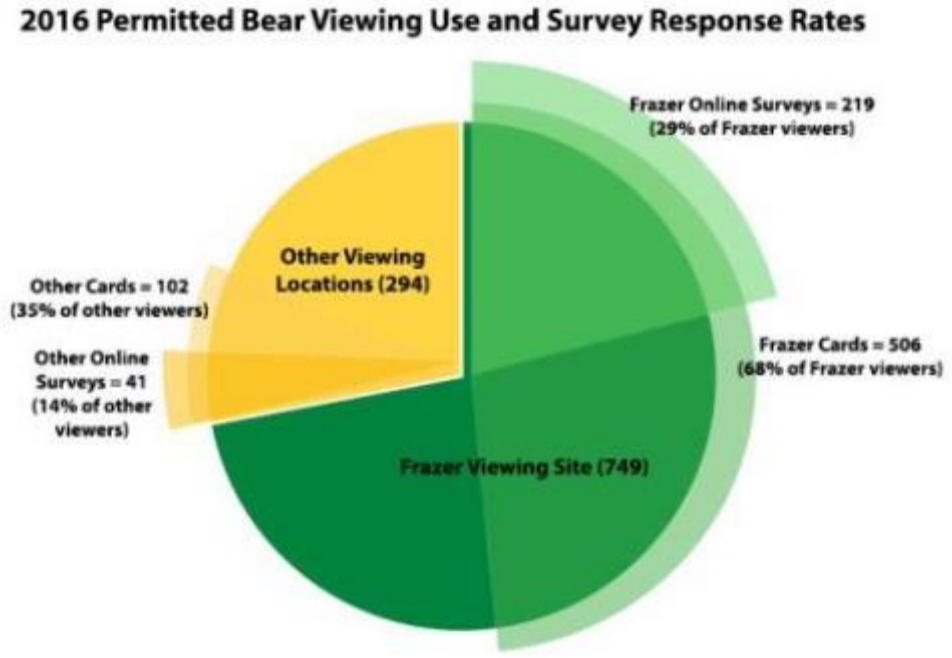


Figure 5

Visitor Characteristics

Demographics

Eighty-three percent (n=217) of individuals who participated in the online survey answered the demographic questions at the end of the online survey. The respondent base was split almost evenly amongst males and females, who comprised 49.5% and 50.5% of respondents respectively. The vast majority of respondents reported some level of higher education, where 32% were college graduates with a Bachelor's degree, and a total of 47% reported having a post-graduate degree. Additionally, 95% of respondents selected white as their race, and 51% reside in a metropolitan area. Compared to many other wildlife refuges within the National Wildlife Refuge System, the Kodiak Refuge attracts a significant proportion of international visitors. In initial survey cards, 25% reported residing outside of the United States. In the online survey, only 17% reported living outside of the United States. The ratio shift in responses between the card and online phase of the survey could be associated with a language barrier that might have contributed to non-response error among international visitors.

Motivations and Expectations

In addition to demographic information, it was important to understand the motivations and expectations of visitors. Participants were provided with a list of six possible motivations for viewing Kodiak bears, and asked to select any that were significant to them. The top motivation was seeing bears in their natural habitat (selected by 69.6% of respondents). Learning more about bears in Alaska was the second most popular choice (selected by 32.3%), and traveling with friends or family was third (selected by 17.7%). Concurrent with the motivations expressed in stakeholder interviews, reality television was listed as a motivating factor by 15% of respondents. Participants were also asked to choose their most important aspects of a bear viewing trip from a list of eight aspects, and rate them from one to three (one being the most important, see Figure 6). The most frequent choices were close proximity to bears (70% of respondents rated in their top three), a large quantity of bears (chosen by 60%), and the feeling of being in the wild (chosen by 55%). Available amenities and a sense of risk were the lowest rated aspects (Figure 6). Finally, over half of visitors who completed the online survey indicated that they had viewed bears previously before their Kodiak trip: 29% of respondents viewed bears at Denali National Park, 11% went to Katmai National Park, and 12% had been to some other bear viewing location in Alaska, while 37% of respondents indicated that the Kodiak Refuge was the only place they have viewed bears.

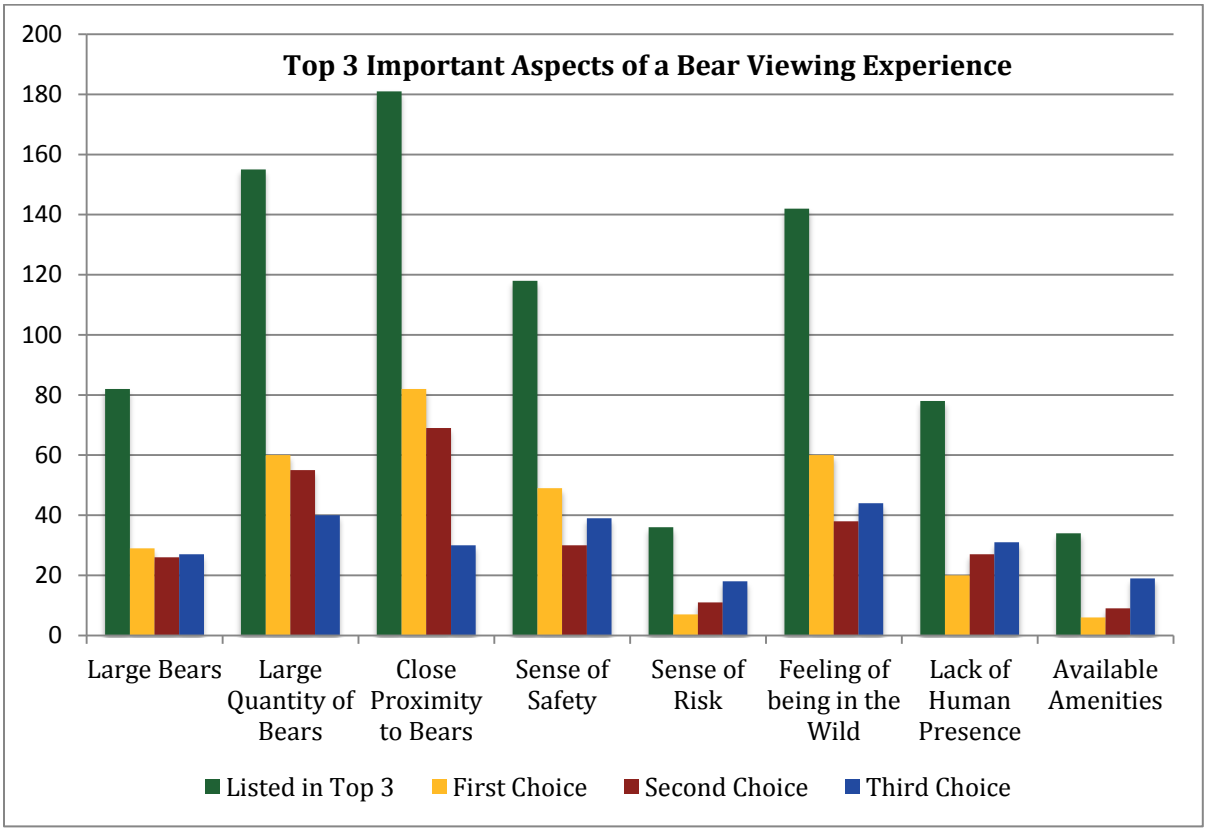


Figure 6

Perception of other public uses

Wildlife viewing is one of the six "appropriate and compatible" wildlife dependent uses outlined by the 1997 Refuge Improvement Act, along with photography, hunting, fishing, interpretation, and environmental education. Due to their relevance to bear viewing, perceptions of education and hunting were explored in the survey. When asked about the role of education in bear viewing, 42% of respondents felt that education was a critical part of understanding wildlife and habitat, 21% thought it depended on the situation, 29% valued education but thought it should be provided prior to the viewing experience, and 8% felt that education should not be part of the experience at all. In regards to hunting, 25% of respondents felt that the Kodiak bear should never be hunted, and 10% indicated that hunting is only acceptable when done for subsistence purposes. Forty-eight percent felt that it was an acceptable activity when managed sustainably, and 18% felt that hunting the Kodiak bear was acceptable but should not occur in the same areas that bear viewing occurs.

The Nature of Bear Viewing on the Kodiak Refuge – Frazer

Trip Satisfaction and Social Characteristics

The Frazer viewing site was the primary viewing location for 84% (219) of online respondents. An overwhelming majority of Frazer respondents (93%) reported that the trip either met or exceeded their expectations. The vast majority also reported being on a half-day viewing trip, with 43% spending one to two hours on the viewing pad, and 47% spending more than two hours but less than four. Furthermore, most visitors reported being satisfied with the amount of time they spent bear viewing: 84% felt that their time on the viewing pad was sufficient, while 16% would have liked more time, and only one individual felt they spent too much time bear viewing. These results demonstrate that most visitors to Frazer are seeking short term viewing experiences, and are satisfied with the short nature of the Frazer experience. Only 15% of Frazer respondents felt that the fish pass structure had a negative effect on their trip, and visitors were more likely to express negative opinions toward the fish pass if they had previous bear viewing experience at other sites (especially Katmai National Park). This is consistent with past arguments that visitors judge the quality of their trip based on past experiences and the context of where prior recreation activity took place (Hall & Shelby, 1996; White, Virden, & Van Riper, 2008). Additionally, those who listed having a wilderness experience as a top motivational factor for bear viewing were actually more likely to indicate that the fish pass had a positive effect on their experience, compared to those who were not motivated by a wilderness experience. This raises an interesting point on what bear viewers perceive to be a wilderness experience.

Site Characteristics: The Frazer Viewing Site

As the highest visitor density bear viewing area on the refuge, it was important to understand public perception of site characteristics specific to the Frazer viewing site. In regards to the mile-long walk to the viewing pad from Frazer Lake, 92% of Frazer respondents felt that the walk was reasonable. Frazer is also currently the only utilized site on the refuge that confines visitors to a designated viewing area. Most visitors shared the viewing pad with between six to twenty other people, with 17% reporting one to five others on the viewing pad, 49% reporting six to ten others, 34% reporting eleven to twenty other people on the pad, and only one individual reporting sharing the pad with more than twenty people. Ninety percent of respondents were not bothered by the people around them, and only 10% felt the pad was too crowded. A chi-square test for independence indicated a significant yet moderately weak association between the number of people on the viewing pad and feelings of crowding on the pad ($p < .001$, Cramer's $V = .286$). Feelings of crowding increased steadily with the reported number of people on the viewing pad, where no one who shared the pad with 1-5 people thought there were too many people, 5.6% of people who shared the pad with 6-10 others felt there were too many people, and 21.6% of people who reported sharing the pad with eleven to twenty others felt that there were too many people. While the majority of visitors did not feel that crowding was an issue, continuing to monitor for the social carrying capacity of viewing locations should be an important aspect of ongoing management planning (Nielsen et al., 1977).

Physical Characteristics: The Bear Experience at Frazer

Out of 219 Frazer respondents, only three individuals reported that they did not see any bears on their viewing trip: 29% reported seeing one to five bears, 50% reported six to ten bears, and 20% reported eleven to twenty bears. The majority of Frazer respondents were satisfied with the number of bears they saw, where 44% saw the number they were expecting to see and 33 saw more bears than they were expecting to. Visitors were more likely to report seeing more bears than expected if they saw more than ten bears: while 30.8% of those who reported seeing six to ten bears reported seeing more than they expected, 67.4% of visitors who reported seeing eleven to twenty bears reported seeing more than they expected.

Sows and cubs were the most common types of bears reportedly seen at Frazer, where 82% of visitors saw at least one sow, and 75% reported seeing cubs. Other types of bears were less common, where 30% reported seeing subadults, and 17% believed they had seen a boar. Most respondents were satisfied with their perceived proximity to bears at the Frazer site: 59% felt that they had gotten within 50 feet or less of a bear during their time viewing, while 41% felt that the bears were further than 50 feet away but never too far to see well without the use of binoculars or a spotting scope. A majority of 84% felt that the bears were at a comfortable distance, while 13% would have liked to have gotten closer, and 3% of visitors felt that the bears were too close for comfort. A chi squared test for independence revealed a statistically significant but relatively weak association between reported proximity and feelings about proximity ($p = .008$, Cramer's $V = .215$), where 20.9% of visitors who were further than 50 feet from a bear wished they had gotten closer, compared to only 7.1% of people who reported being within 50 feet.

The Nature of Bear Viewing on the Kodiak Refuge – Other Sites

Trip Satisfaction and Social Characteristics

A total of 41 survey participants indicated that they viewed bears at a site other than the Frazer viewing site, with 90% being first time visitors and four individuals returning from a previous year. When asked to indicate which factors were motivations for choosing the specific viewing site within the Kodiak Refuge, the top choices were having a wilderness experience (83%), specifically seeing Kodiak bears (80%), and having a multi-day experience (71%). The majority of visitors were satisfied with their experience, with 52% reporting that it met their expectations, and 43% reporting that it exceeded their expectations. When presented with a list of possible changes to the physical viewing experience, 80% of responding visitors felt that no improvements were necessary. This suggests that the majority of respondents from sites other than Frazer are seeking experiences without infrastructure or development. Additionally, 72% of respondents were content with the amount of walking they did throughout their bear viewing trip. Finally, 89% of responding visitors felt that they received a sufficient amount of information, while 12% would have liked to receive more information onsite and only one individual would have liked more information prior to arrive at the viewing site.

Site Characteristics

Respondents at non-Frazer sites were highly satisfied with the lack of amenities and longer stays at their remote viewing locations, reinforcing many stakeholders' opinions that Frazer attracts a very different clientele from those who pursue other viewing experiences. All 41 respondents from sites other than Frazer saw at least one bear during their trip, and on average they reported seeing more bears than Frazer visitors. Compared to Frazer, a greater percentage of visitors (46%) saw more bears than they were expecting to. Similar to Frazer, sows and cubs were the most common types of bears seen, where 100% of respondents saw at least one sow, and 95% reported seeing cubs. Other types of bears were more commonly reported than Frazer, where 86% reported seeing subadults, and 54% reported seeing a boar. Reported proximity was very comparable to Frazer reports, where 57% of responding viewers felt that they had gotten within 50 feet or less of a bear during their time viewing, and 39% felt that the bears were further than 50 feet away but never too far to see well without the use of binoculars or a spotting scope (two individuals felt that they needed a spotting scope to see bears well). Most visitors were comfortable with their perceived proximity, where 76% felt that the bears were at a comfortable distance, 17% would have liked to have gotten closer, and 7% of visitors felt that the bears were too close for comfort. Table 1 displays the differences in number of bears seen, expectations for number of bears, perceived proximity to bears, and feelings about proximity between visitors to the Frazer viewing site and other locations.

Table 1: Bear Experience Comparisons

Number of Bears Seen and Feelings toward Number Seen					
	0 Bears	1-5 Bears	6-10 Bears	11-20 Bears	20+ Bears
Frazer	1% (3)	29% (62)	50% (107)	20% (43)	1% (3)
Other Locations	0% (0)	25% (10)	25% (10)	40% (17)	10% (4)
	Less than Expected		Same as Expected		More than Expected
Frazer	23% (50)		44% (95)		33% (77)
Other Locations	26% (12)		28% (13)		46% (21)
Perceived Proximity to Bears and Feelings toward Proximity					
	Too far to see without aid		Over 50 ft but visible		50 ft or closer
Frazer	0% (0)		41% (87)		59% (127)
Other Locations	4% (2)		39% (16)		57% (23)
	Wish I was closer		Comfortable Distance		Too close for comfort
Frazer	13% (27)		84% (179)		3% (6)
Other Locations	17% (7)		76% (31)		7% (3)

Significant Influences on Bear Viewing Experiences

Due to the small respondent number for sites other than Frazer, the Frazer site is the sole focus for site-specific questions addressing significant influences on bear viewing experiences. Bear proximity, the number of bears, and the feeling of being in the wild were the top three aspects chosen by respondents to indicate a high quality viewing experience. When tested with chi square tests for independence, the number of bears seen and bear composition yielded statistically significant but moderately weak associations with overall trip satisfaction: the proportion of visitors whose trips exceeded their expectations steadily increased with the number of bears seen ($p = < .001$, Cramer's $V = .235$), and visitors were more likely to report exceeded expectations if they saw a boar. While proximity to bears was not directly related to trip satisfaction, there was a significant difference ($t = 2.186$; $p = .03$) in knowledge scores specific to learning about bears between visitors who reported being 50 feet or closer to a bear (average score of 4.07 out of 5), and those who reported being further than 50 feet from a bear (average score of 3.83 out of 5).

Attitudinal, Behavioral Intention, and Knowledge Changes

The survey section addressing attitudinal, behavioral intention, and knowledge changes included bear viewers from all sites. Scores for attitudinal, behavioral intention, and knowledge scales all reflect overall positive shifts. In the attitudinal scale, over half of respondents reported that after their bear viewing trip, they agreed more that bears are not a nuisance, that they are concerned with bear habitat loss around the world, that it is a human responsibility to conserve other biological species and natural habitats, and that wildlife conservation is important because humans have much to learn from wildlife. Within the behavioral intention scale, the highest percentage of respondents for 8 out of 12 items reported that they already engaged in the appropriate behavior and would not change their behavior. This suggests that while behavioral intention scores may not express high levels of change in intentions, many visitors may already be knowledgeable of appropriate behaviors related to bear interactions and perceive their current level of engagement as sufficient. Finally, individual items within this knowledge change scale for which 78% or more respondents reported positive knowledge change were bear biology, behavior, habitat, and the U.S. Fish and Wildlife Service. However, this does not specifically explain what visitors learned about each subject, or whether the information is accurate. Future studies on behavior in wildlife interactions could benefit from integrating previously-tested scales to measure behavior.

Results from the attitudinal, behavioral intention, and knowledge sections also suggest broader theoretical implications. Consistent with previous findings (Campbell, 2013; Kellert, 1994; Lee & Moscardo, 2005), females reported higher attitude and behavioral intention scores on topics related to conservation. Respondents with higher levels of education produced lower behavioral intention scores than respondents who did not have a college degree, suggesting that higher education may be associated with prior knowledge of appropriate behaviors in bear country, and little perceived need to adjust the level of engagement in that behavior.

Conclusions

Results of this study present several initial implications for the Kodiak Refuge. Since the majority of visitors to the Frazer site were satisfied with the nature of their experience, continued management of the site as it has been managed in recent years (with permitted operators and U.S. Fish and Wildlife Service staff onsite) is advisable. However, the association between number of bears seen and trip satisfaction should be considered in visitor use management decisions with ongoing biological monitoring of bear density. A shift in bear use of key salmon streams due to an early ripening of berries that overlaps with the height of salmon runs (Deacy, Leacock, Armstrong, & Stanford, 2016) has contributed to lower bear densities during key bear viewing periods. This could have important implications for visitors' satisfaction with viewing sites like Frazer, especially when it is currently the only structured location available to commercial operators.

As bear viewing continues to be a prominent use on the refuge and the possibility of new opportunities are considered, there are several aspects of current bear viewing to reflect on. The demographic characteristics of respondents support the notion that bear viewing is primarily available to and utilized by people with higher incomes. If using bear viewing as an educational opportunity for the general public is a priority, management may want to consider ways to expand the demographics who have access to bear viewing opportunities. Additionally, due to the short-term nature of the Frazer experience, any new viewing sites that may be developed in the future could be more focused on in-depth educational components rather than focusing on efficient photography opportunities. Bear viewing management decisions impact stakeholders and their ability to operate. Therefore, building on this foundation of ongoing communication between managers and stakeholders will be critical (Zinn et al., 2000).

While many aspects of this research project were successful, there are many possibilities for improvement. Bear proximity, composition, and numbers are physical aspects of bear viewing trips that are quantifiable and could be studied in much more detail for their relationship with various trip outcomes. In future studies, visitors' perceived proximity to wildlife could be assessed for accuracy by providing respondents with pictures and asking them to indicate perceived distance. Comparing these responses could create a more realistic understanding of whether or not visitors were accurately reporting their distance from wildlife onsite. Similarly, photos of different bear types could be provided to assess whether visitors are accurately reporting which types of bears they saw. There is also much potential to better understand behavioral and knowledge outcomes. Standards for desired behavior could be established and monitored by researchers onsite. Additionally, a measurement of knowledge outcomes beyond reported changes could be developed and administered before and after trips. This could involve managers and biologists compiling a list of information they hope visitors will come away with, and administering pre- and post-tests at a variety of bear viewing locations. Finally, future studies could benefit from employing Likert scales to measure how likely individuals are to engage in a specific behavior before and after their trip.

While this process was successful in collecting a wide range of information, the ongoing challenge will be using the data to create socially responsive management standards that are monitored and adjusted as needed over time (Bath, 1998; Laven & Krymkowski, 2005).

Concurrent with ongoing biological monitoring of natural resources, the Kodiak Refuge should incorporate an ongoing effort to inventory and monitor visitation patterns and experiences to adjust management standards over time. Monitoring should include topics like tolerance to visitor density at the Frazer viewing site, and public expectations for bear viewing on the refuge (Bath 1998; Laven & Krymkowski, 2005; Needham et al., 2013; Nielsen et al. 1977). The Kodiak National Wildlife Refuge has the opportunity to set an example of what successfully managed, high quality bear viewing with conservation benefits looks like. However, this will require ongoing monitoring of social and physical conditions, which are constantly changing and interacting in new ways.

Acknowledgements

This project would not have been possible without Visitor Services Manager Hans Klausner. Additional thanks to Human Dimensions Branch Chief Natalie Sexton for her enthusiastic support and guidance. Dr. Richard Krannich, Dr. Courtney Flint, and Dr. Mark Brunson at Utah State University were incredible assets to this work in their roles on the thesis advisory committee. Bear biologist Bill Leacock provided vital feedback on multiple phases of the survey measurement tool and its content. Several Visitor Services staff at the Kodiak Refuge were especially crucial in achieving such a high response rate for survey cards, including Kari Eschenbacher and Lisa Hupp who assisted at the Frazer fish pass, and Kyle Coleman, Jerusha Turner, and Grace Neff who were crucial to covering missed visitors in town. Special thanks to all the commercial air taxi operators and permitted guides who assisted in the distribution and administration of the first phase of the survey. Additional thanks to all stakeholders who participated in the 2015 interview process and provided invaluable insight. Finally, thanks to all refuge managers and other staff who have supported this project in all of its phases.

Literature Cited

Allen, S., & Collins, A. (2002). An assessment of bear viewing opportunities relevant to management of Kodiak National Wildlife Refuge. *Anchorage, AK: US Department of the Interior, Fish and Wildlife Service, Division of Refuges*.

Bath, A. J. (1998). The role of human dimensions in wildlife resource research in wildlife management. *Ursus*, 349-355.

Brown Bear Management Strategy. (2000). Alaska Board of Game and ADF&G Division of Wildlife Conservation. Douglas.

Campbell, M. O. N. (2013). The relevance of age and gender for public attitudes to brown bears (Ursus arctos), black bears (Ursus americanus), and cougars (Puma concolor) in Kamloops, British Columbia. *Society and Animals*, *21*, 341-359.

Comprehensive Conservation Plan. Kodiak National Wildlife Refuge. (2007).

Deacy, W. & Leacock, WB. (2015). Kodiak Brown bear-sockeye salmon foraging ecology in southwest Kodiak Island, Alaska: 2015 progress report. Refuge report 2015.2., U.S. Fish and Wildlife Service, Kodiak National Wildlife Refuge, Kodiak, Alaska.

Deacy, W., Leacock, W., Armstrong, J. B., & Stanford, J. A. (2016). Kodiak brown bears surf the salmon red wave: direct evidence from GPS collared individuals. *Ecology*, *97*, 1091-1098.

Dodge, H. B. (2004). *Kodiak Island and its Bears: A History of Bear/Human Interaction on Alaska's Kodiak Archipelago.* Anchorage, Alaska: Great Northwest Publishing.

Drygas, H. & Hladick, C. (2015). Departments collaborate to promote tourism. *Alaska Economic Tends August 2015,* 35-38.

Duffus, D. A., & Dearden, P. (1990). Non-consumptive wildlife-oriented recreation: A conceptual framework. *Biological Conservation*, *53*, 213-231.

Fortin, J. K., Rode, K. D., Hilderbrand, G. V., Wilder, J., Farley, S., Jorgensen, C., & Marcot, B. G. 2016. Impacts of human recreation on brown bears (Ursus arctos): A review and new management tool. *PloS one*, *11*, e0141983.

George, D. & Mallery, P. (2003). SPSS for windows step by step: a simple guide and reference. Pearson Education Inc.

Gill, J. A., Sutherland, W. J., & Watkinson, A. R. (1996). A method to quantify the effects of human disturbance on animal populations. *Journal of applied Ecology*, 786-792.

Hall, T., & Shelby, B. (1996). Who cares about encounters? Differences between those with and without norms. *Leisure Sciences*, *18*, 7-22.

Johansson, M., Karlsson, J., Pedersen, E., & Flykt, A. (2012). Factors governing human fear of brown bear and wolf. *Human dimensions of wildlife*, *17*, 58-74.

Keating, J.M. (2016). The Human Dimensions of Brown Bear Viewing in the Kodiak National Wildlife Refuge, Alaska: 2015 Progress Report. Refuge Report 2016.1, Kodiak National Wildlife Refuge, U.S. Fish and Wildlife Service, Kodiak, AK.

Kellert, S. R. (1994). Public attitudes toward bears and their conservation. *Bears: Their Biology and Management*, 43-50.

Laven, D. N., & Krymkowski, D. H. (2005). The relationship between visitor-based standards of quality and existing conditions in parks and outdoor recreation. *Leisure Sciences*, *27*, 157-173.

Lee, W. H., & Moscardo, G. (2005). Understanding the impact of ecotourism resort experiences on tourists' environmental attitudes and behavioural intentions. *Journal of sustainable tourism*, *13*, 546-565.

National Wildlife Refuge System Improvement Act of 1997. (1997). Public Law 105-57.

Needham, M. D., Ceurvorst, R. L., & Tynon, J. F. (2013). Toward an approach for measuring indicators of facility carrying capacity in outdoor recreation areas. *Journal of Leisure Research*, *45*, 345.

Nielsen, J. M., Shelby, B., & Haas, J. E. (1977). Sociological carrying capacity and the last settler syndrome. *Pacific Sociological Review*, 568-581.

Powell, R. B., Kellert, S. R., & Ham, S. H. (2009). Interactional theory and the sustainable nature-based tourism experience. *Society and Natural Resources*, *22*, 761-776.

Rode, K. D., Farley, S. D., Fortin, J., & Robbins, C. T. (2007). Nutritional consequences of experimentally introduced tourism in brown bears. *The Journal of wildlife management*, *71*, 929-939.

Shanks, A. & Rasmussen, D. (2010). The Kodiak island borough. *Alaska Economic Trends June 2010, 30*, 6.

Smith, T. S., Herrero, S., & DeBruyn, T. D. (2005). Alaskan brown bears, humans, and habituation. *Ursus*, *16*, 1-10.

Troyer, W. A. (2005). *Into Brown Bear Country*. University of Alaska Press.

White, D.D., Virden, R.J., & Van Riper, C.J. (2008). Effects of place identity, place dependence, and experience-use history on perceptions of recreation impacts in a natural setting. *Environmental Management*, *42*, 647-657.

Whittaker, D. (1997). Capacity norms on bear viewing platforms. *Human Dimensions of Wildlife,* 2, 37-49.

Wilker, G.A. & Barnes, V.G. (1998). Responses of brown bears to human activities at O'Malley River, Kodiak Island, Alaska. *Ursus 10*, 557-561.

Zinn, H. C., Manfredo, M. J., & Vaske, J. J. (2000). Social psychological bases for stakeholder acceptance capacity. *Human Dimensions of Wildlife, 5*, 20-33.